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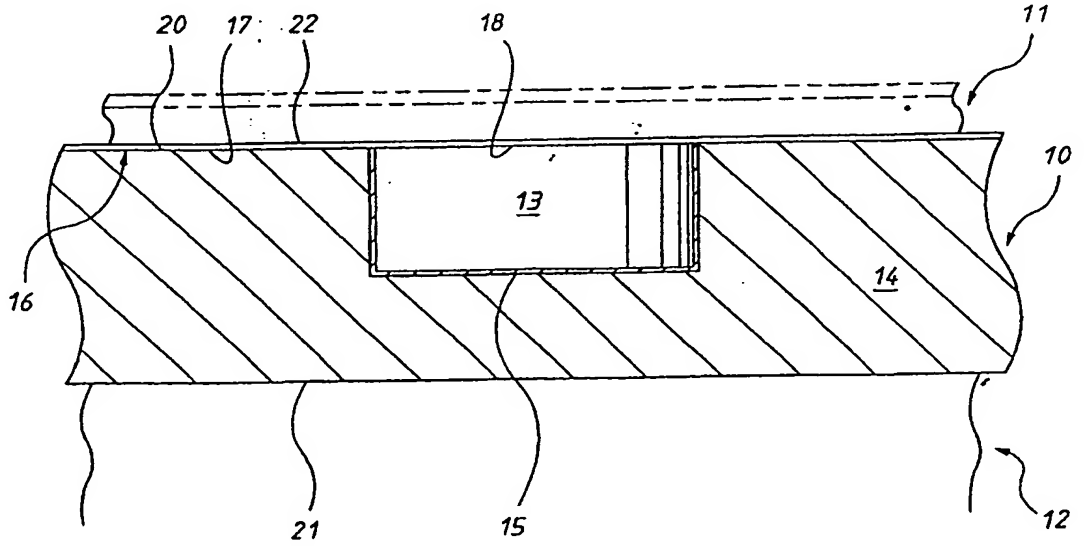
(54) Title: MAGNETIC HOLDING DEVICE



(57) Abstract

A magnetic holding device (10) to secure a steel back photo polymer plate (11) to a foil heat stamping element (12). The device (10) has at spaced locations a plurality of magnets (13) embedded in the body (14). The body (14) is formed of engravers brass and the magnets (13) are secured in apertures in the body by means of an adhesive.

MAGNETIC HOLDING DEVICE

Technical Field

The present invention relates to magnetic holding devices such as that disclosed in Australian Patent Application 17618/95 employed in the field of graphic arts, such as foil stamping.

Background of the Invention

The above-mentioned Australian patent application discloses a holding device which secures a steel back polymer plate to a heating element, for the purposes of transferring thin metal foil or leaf to paper, card, plastics material or similar media.

Use of the above-mentioned holding device demonstrated a number of shortcomings including the magnets employed progressively loosing their magnetic strength. A further problem was securing the magnets to the body of the device. Various methods employed were found to be unsuitable when subjected to continuous heat and pressure. A more significant problem was oxidation of the surface of the device after machining. This oxidation led to the surface of the magnets being gradually eroded until they were below the surface of the device. This resulted in uneven surface dimensions which gave poor stamping results.

Object of the Invention

It is the object of the present invention to overcome or substantially ameliorate at least one of the above disadvantages.

Summary of the Invention

There is disclosed herein a magnetic holding device to secure a steel backed polymer plate to a foil stamping heating element, said device having:

a body having a body surface to engage the plate;

a plurality of magnets embedded in the body so as to each have a magnetic surface substantially co-planar with respect to said body surface, the magnets being provided to urge the plate into contact with the body and magnetic surface; and

a layer of nickel covering said body surface and the magnetic surface.

Preferably, said body is generally planar and said body surface is generally planar.

In an alternative arrangement said body is generally arcuate and said body surface is generally arcuate. In a specific form the body is circular in transverse cross-section and said body surface is circular.

Preferably the layer of nickel is between 0.1 millimetres and 0.025 millimetres.

Preferably the magnets are secured within the body by Loctite 620 (registered trade mark).

Preferably the magnets are Samarium Cobalt Disc Magnets.

There is further disclosed herein a method to produce the above-described attachment device, said method including the steps of:

providing said body with apertures to receive said magnets;

placing an adhesive in the apertures;

placing the magnets in the apertures so as to be secured to the body with the aid of the adhesive;

machining the body and magnets so as to provide said body surface and magnet surfaces;

nickel plating the body and magnets so that the layer of nickel covers said body and magnetic surfaces.

Preferably the machining step is a grinding or milling process.

Preferably the body provided is heat annealed to relieve surface tension prior to machining.

Preferably the body is engraver's brass.

Preferably the body is milled so as to provide a flat surface to be drilled to form said apertures.

Preferably the nickel layer is 0.05 millimetres in thickness prior to machining.

Preferably the nickel layer is 0.1 to 0.025 mm in thickness after machining.

Preferably a sealant is applied to the magnetic surface after machining, which sealant is removed before the nickel plating.

Detailed Description of the Preferred Embodiment

In the accompanying drawing there is schematically depicted in sectioned side elevation a portion of a magnetic holding device securing a steel backed photo polymer plate to a foil stamping heating element.

More particularly, there is shown in the attached drawing a portion of a holding device 10, securing a steel back photo polymer plate 11 to a foil stamping heating element 12. In that regard it must be appreciated that the device 10 has at spaced locations a plurality of magnets 13 embedded in the body 14.

The body 14 is formed of engraver's brass that when initially provided has been heat annealed to relieve surface tension. The body 14 provided has its surface 15 milled to remove approximately .2 millimetres from both major surfaces. This leaves the body 12 with a depth of approximately 5.3 millimetres. The body 14 is drilled to provide a pilot hole to facilitate the drilling of a blind hole to a depth of approximately 2.85 millimetres. The blind holes receive the magnets 13. The magnets 13 initially are approximately 3 millimetres thick and about 10 millimetres in diameter. As mentioned previously, the magnets 13 are preferably Samarium Cobalt Disc magnets. However, to ensure securing of the magnets 13 within the body 14, there is provided in each blind hole a layer of adhesive (Loctite 620 (registered trade mark)) 15. The layer 15 generally surrounds the magnets 15 so as to compensate for imperfections in the magnets 15 and formation of the blind holes within which they are located. The body 14 and magnets 13 are then machined (preferably by grinding or milling) so as to provide the body 14 with a body surface 17 and each of the magnets 13 with a magnetic surface 18. The surfaces 17 and 18 are therefore substantially coplanar and provide an attachment surface 16. After machining, a sealant such as Rocol Moistureguard Spray Sealant is placed over the surfaces 18. The body 14 and magnets 13 are also nickel plated so that a layer of nickel 20 overlays the surfaces 17 and 18, only after the sealant has been removed.

Preferably the Loctite is allowed to cure for approximately 12 hours prior to grinding or milling to provide the surfaces 17 and 18. Preferably the milling or grinding is performed in two stages, one stage removing 0.15 millimetres to provide the surfaces 17 and 18 and the second stages removing .15 millimetres to provide the surface 21. The thickness of the body 14 after grinding is approximately 5 millimetres, the thickness of the layer 20 (prior to machining) is approximately 0.075 millimetres. The layer 20 is preferably applied after the surfaces 17 and 18 have been lightly sanded. Finally, the external surface 22 of the layer 20 may also be lightly grounded in order to

improve its smoothness. The device 10, after final grinding will be about 5.05 millimetres thick.

Preferably the layer 20 has a thickness (after machining) of 0.1 millimetres to 0.025 millimetres, most preferably about 0.025 millimetres.

The above-described preferred embodiment of the present invention exhibits a number of advantages including greater cycle life. Still further, the Samarium Cobalt Disc Magnets have a greater operating temperature (250°C to 350°C) which provides the magnets with a prolonged life. The use of the above-mentioned Loctite also enables the device to stand up to continuous heat and pressure typical of the environment of the present invention. Still further, the engraver's brass has been found to be easier to machine while providing superior toughness and heat conductivity while also resisting corrosion.

Engraver's brass is 70/30 Arsenical Brass Alloy 259. As an alternative brass alloy 377 can be used.

The Samarium Cobalt magnets are sintered, with their composition being about 35% Samarium, 60% Cobalt, the balance being Fe and Cu.

It should further be appreciated that the above preferred embodiment is also useable with copper and brass steel backed plates and steel plates.

The above described embodiment may be modified by forming a "through hole" rather than drilling a blind hole within which the magnet 13 is located. Where a through hole is formed the aperture remote from the surface 17 could be closed by a plug (bath).

In respect of the above referred embodiment, the body 14 is generally planar (flat). Accordingly, the surfaces 17 and 18 are also flat. In an alternative arrangement the body 14 could be generally cylindrical so as to have a generally circular transverse cross-section. In such an instance, the surfaces 17 and 18 would be cylindrical.

The claims defining the invention are as follows:-

1. A magnetic holding device to secure a steel backed polymer plate to a foil stamping heating element, said device having:

a body having a body surface to engage the plate;

a plurality of magnets embedded in the body so as to each have a magnetic surface substantially co-planar with respect to said body surface, the magnets being provided to urge the plate into contact with the body and magnetic surface; and

a layer of nickel covering said body surface and the magnetic surface.

2. The magnetic holding device of claim 1, wherein said body is generally planar and said body surface is also generally planar.

3. The magnetic holding device of claim 1, wherein said body is generally circular in transverse cross-section so that said body surface is generally cylindrical.

4. The device of claim 1, 2 or 3, wherein the layer of nickel is between 0.1 mm and 0.025 mm.

5. A method to produce the device of any one of claims 1 to 4, said method including the steps of:

providing said body with apertures to receive said magnets;

placing an adhesive in the apertures;

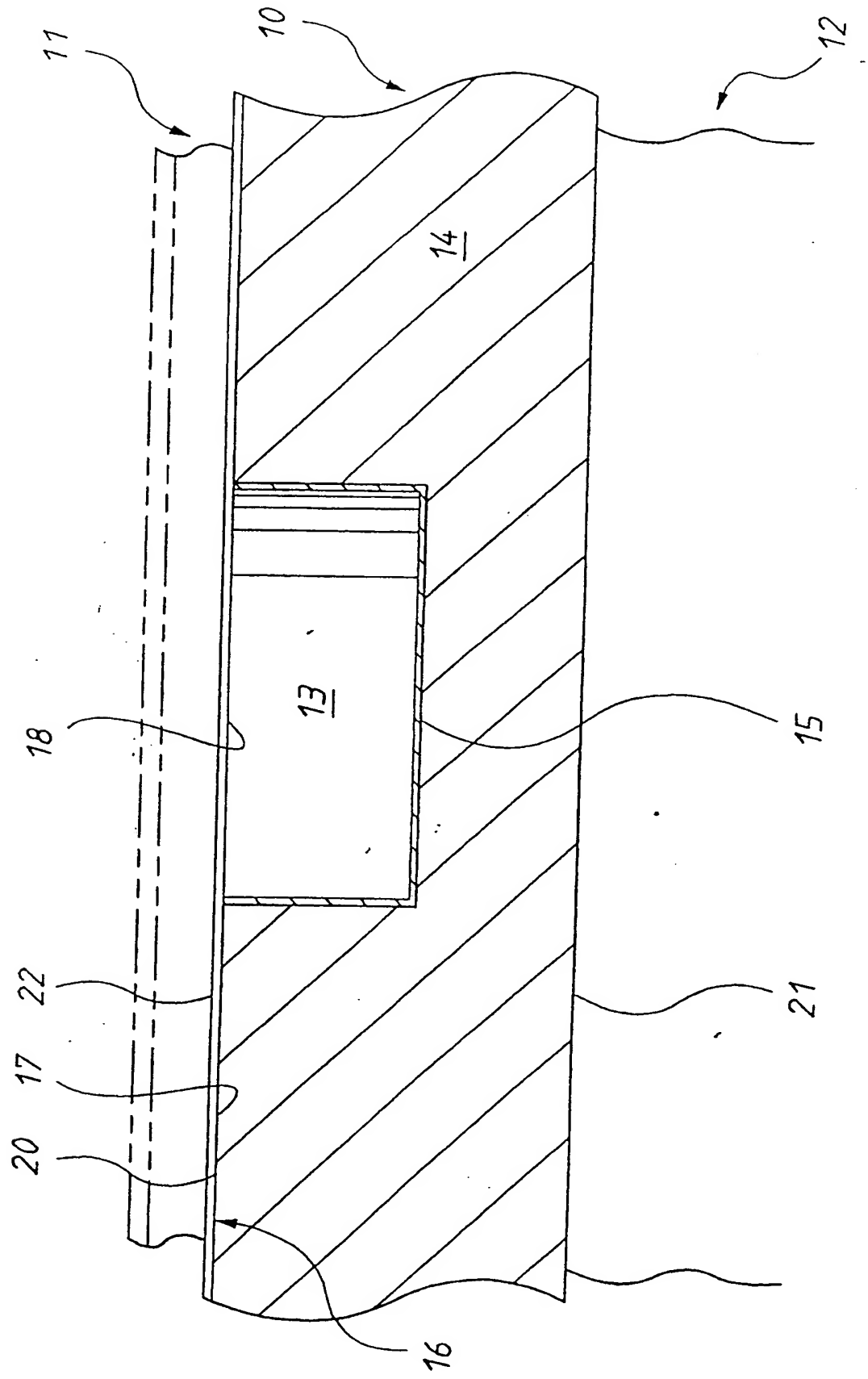
placing the magnets in the apertures so as to be secured to the body with the aid of an adhesive;

machining the body of the magnets so as to provide said body surface and magnetic surface;

nickel plating the body and magnets so that the layer of nickel covers said body and magnetic surfaces.

6. The method of claim 5, wherein the machining step is a grinding or milling process.

7. The method of claim 5, wherein the body provided is heat annealed to relieve surface tension prior to machining.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INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 00/00428

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl[7]: B25B 11/00 B44B 3/06 B44C 1/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC B25B 11/00 B44B 3/06 B44C 1/14

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 1360953 A (CARDONE et al) 24 July 1974 Whole document	1-7
A	US 4777463 A (CORY et al) 11 October 1988 Whole document	1-3
A	GB 1512315 A (BAERMANN) 1 June 1978 Whole document	1-7

☐ Further documents are listed in the continuation of Box C

☒ See patent family annex

* Special categories of cited documents:

"A" Document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 June 2000	29 JUN 2000

Name and mailing address of the ISA/AU	Authorized officer
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU 00/00428

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
GB	1360953	NONE					
US	4777463	CA	1273370	DE	3829814	FR	2620957
		GB	2210509	IT	1229835	JP	1109037
GB	1512315	AU	12218/76	CA	1064572	CH	617033
		DE	2517364	DK	1474/76	FR	2308177
		IT	1058147	JP	51129696	NL	7603171

END OF ANNEX